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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No. 09/237,646	Applicant(s) CASTELLI ET AL.	
	Examiner Cam-Y Truong	Art Unit 2172	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) 1-12 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a)☐ All b)☐ Some * c)☐ None of the CERTIFIED copies of the priority documents have been:

1.☐ received.

2.☐ received in Application No. (Series Code / Serial Number) _____ .

3.☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)
16) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
18) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
19) ☐ Notice of Informal Patent Application (PTO-152)
20) ☐ Other: .

DETAILED ACTION

1. Claims 1-12 are pending in this Office Action.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

3. Claims 5-7 are rejected under 35 U.S.C.102(e) as being unpatentable by Bach et al (or "hereinafter" Bach) (USP 6084595).

As to claim 5, Bach teaches the claimed limitation "at least one database storing said information at said at least one server" as showed in fig.1, an image(i) 102, i.e., the i-th image stored in the database, is fed into an analysis phase module 104 of a visual information retrieval (VIR) engine 100 for analysis. In the analysis phase 104, a feature vector (i) 106 for the image is extracted and stored into a database 108. This process is repeated until all stored images have been analyzed and had associated feature vectors created and stored. In a comparison phase, a feature vector (target) 110 is fed into a comparison phase module 112 VIR engine and the VIR engine sequentially computes distances between the target feature vectors 110 and each feature vector(i) 106 is

stored in the database 108. After comparison is made between individual feature vectors using a distance metric associated with a primitive, the output score is displayed to the user. From these above points, they show that there is a server which includes one or more database in order to make a process of retrieving information from a user query and display the results to the user (col.1, lines 42-65); "a multidimensional indexing engine at said at least one server for maintaining indices related to information in said at least one database " as showed in fig.3, indexing engine 300 runs on a storage server. This indexing engine makes use of a commercial database 308. In this case, the index values 222 corresponding to a particular primitive are stored in the commercial database 308 as "index-only" columns. These values are indexed by the internal index structure for high-dimensional data of the database. A single dimensional structure is used to store values representing multiple dimensional (col.6, lines 32-41), "and for retrieving said indices in response to said query" as indexes, which are implemented using data structures such as B trees inverted index structures, are used to retrieve the desired information from a database. When a query is submitted to visual information retrieval, a query feature vector Q will be specified. The index values are used to reduce the number of feature vectors that are retrieved from the database to complete query (col.2, lines 21-25; col.3, lines 11-13; col.25-35); "a similarity query engine at said server for conducting searches of said at least one database in response to a query" as a similarity engine. In the context of content-based retrieval, an image may be distilled according to one or more primitives. A primitive, which is comprised by each feature vector, where a feature vector (I) 106 for the image is stored in database

308 must include a data representation a distance measure, which ultimately provides the basis for a similarity measurement between two different images. For example, in the third scenario, there are two possibilities:

If an R-tree variant is used, the following steps are used to find the proper vectors.

(a) set i = 1;

(b) use the algorithm of N.Roussopoulos, S.Kelley, F. Vincent, from "Nearest Neighbor Queries" to find the I*B nearest neighbors of vq from the K-dimensional index;

(d) For each vector v(i, j) retrieved, calculate d(j)=dist(vq,v(i,j), where the dist is the weighted Euclidean distance in the example. To processing the above system, there is a server which includes similarity engine (fig.1, col.2, lines 31-60; col.8, lines 7-17); "wherein said similarity query receives information regarding said retrieved indices from said multidimensional indexing engine for identifying database areas to be searched" as each primitive extracts visual feature data which is combined into a feature vector (target), where the target feature vector represents an image for which the user desires to find similar images. Also, a primitive must include a data representation and a distance measure, which ultimately provides the basis for similarity measurement between two different images. Using index values to reduce the number of feature vectors that are retrieved from the database to complete the query. For example, to find proper vector, using the algorithm "Nearest Neighbor Queries" to find the I*B nearest neighbors of vq from the k-dimensional index. Each vector v(i,j) retrieved, calculate d(j)-dist(vq, v(i,j)), where d(j) is a index from indexing engine which includes a index

structure for High-Dimensional Data (col.1, lines 35-41; col.2, lines 36-46; col.8, lines 10-25; col.7, lines 5-6; col.4, lines 33-35).

As to claim 6, Bach teaches the claimed limitation "displaying retrieved information at said client location and for receiving user input regarding said retrieved information" as in a stock photography scenario, a publisher may desire to see photographs of sunsets which satisfy a certain criteria established by selecting weights 114. A set of thumbnail sketches may be presented on visual display showing the results to the publisher. This information indicates that after receiving user input data, inputted data is retrieved and displayed on the publisher's computer monitor (col.1, lines 60-65).

As to claim 7, Bach teaches the claimed limitation "multidimensional indexing engine is adapted to refine said indices based on said user input" as, indexing Engine shows that the set of constraints 232 at the output of the constraint generation function 230 are then applied to the index structure 310 so as to identify index values used to select from among the universe of feature vectors stored in the data store by using index generation function to generate or compute indexes. The index generation can choose the dimensionality of the index (n-dimensional). The index values are used to reduce the number of feature vectors that are retrieved form database to complete the query. These above points indicate that index values belong to indexes. Therefore, when identifying index values to select feature vectors, it means refining indices which

depend on requested query (fig.2, fig.3, col.5, lines 55-58; col.4, lines 33-36; col.9, lines 62-63; col.10, line 42)

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a), which forms the basis for all obviousness rejections, set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bach as applied to claims 5 and 6 in view of Zhang et al (or hereinafter "Zhang") (USP 5832182).

As to claim 8, Bach discloses the claimed limitation "processor means for reformulating said query based on said user input" as mentioned in claim 5, there is a server which includes one or more database in order to make a process of retrieving information from user query and display the results to users. From this point, it is obviously that the server 110 could be any one of a number of conventional processors such as another personal computer, a mini-computer, a mainframe (col.1, lines 45-65). In addition, Zhang teaches the claimed limitation " reformulating said query based on said user input" as the invention uses Iterative Optimization, this approach starts with an

initial partition, then tries all possible moving or swapping of data points from one group to another to see if such a moving or swapping improves the value of the measurement function. In addition, the invention may be carried out with an incremental method that should be capable of working with data which is input incrementally, not necessarily all at once. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply Zhang's teaching of using iterative Optimization approach with increment method to Bach's system in order to minimize the access time, i.e. the average number of index pages that a given query must access.

6. Claims 1-4, and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatenable over Bach in view of Zhang.

As to claims 1 and 9, Bach teaches the claimed limitation "first searching said database to retrieve data based on said query; presenting retrieved data to user" as to search very large databases of visual objects, such images, which may contain upwards of one million or more images. Since content-based retrieval allows for the defining of more than one primitive (each primitive being associated with a visual characteristic such as color, texture, shape, and so forth). Each primitive extracts visual feature data which is combined into a feature vector. A target or query feature vector is compared to the feature vectors which have previously been computed. These feature vectors are typically stored in a database. The target feature vector represents, for example, an image for which the user desires to find similar images. The output score 116 is a scalar which can be used to select the best result or rank order the results for further

searching. For example, in a stock photograph scenario, a publisher may desire to see photographs of sunsets which satisfy a certain criteria established by selecting weights 114. A set of thumbnail sketches may be presented on a visual display showing the results to the publisher and allowing for refinement by repetitive searching (col.1, lines 14-65). Bach does not disclosures the claimed limitation " receiving user input; transforming said database based on said user input to generate a transformed database; successively searching said transformed database to retrieve data; repeating step b through e until the results for the said query is satisfied by the user". However, Zhang disclosures that Interactiveness: the method should be able to accept feedback from users to interactively fine-tune the search for patterns (col.1, lines 34-35). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply Zhang's teaching of using Interactiveness method which should be able to accept feed back from users to interactively fine-tune the search for patterns to Bach's system in order to provide very efficient retrieval of information from the database to user's desire.

As to claims 2 and 10, Bach teaches that "reformulating the query based on said user input" as Iterative Optimization, this approach starts with an initial partition, then tries all possible moving or swapping of data points from one group to another to see if such a moving or swapping improves the value of the measurement function. In

addition, the invention may be carried out with an incremental method that should be capable of working with data which is input incrementally, not necessarily all at once. Also, an incremental method that does not require the whole dataset in advance and with only one scan of the dataset being required. The user can either specify the number of clusters, K, or a natural value determined from the dataset (col.1, lines 36-38; col.5, lines 29-39), "and wherein said searching said transformed database comprises searching said transformed database based on said reformulated query" as searching a graph in which each node is a potential solution by following the IO method. First, cluster representatives are medoids, (2) beam size = infinity and checking all neighbors and at most maxneighbor (3) searching numlocal times. For every checked neighbor, IO method has to scan the whole dataset to calculate the increase or decrease of measurement value to decide if the neighbor is better or worse. This is a drawback for use in very large database, e.i Assume N=1000 and K= 10. Then the graph has about 1000^10 /10=2.76x10^24 node. Each node in the graph has 10*(1000-10)=9900 neighbors. Assume that IO only searches a small protion of the graph. Assume that for each node it searches, on average. Then, the entire dataset must be scanned 25 times of a single node (col.3, lines 45-67; col.4, lines 1-10)

As to claims 3 and 11, Bach teaches the claimed limitation "extracting indices from said database and wherein said searching is preceded by retrieving indices to focus said search on indexed information in said database" as a feature vector (I) 106

which can be used as an index for the image is extracted and stored into a database 108. Also, information computed from the feature vector. An index is used to retrieve the desired information from a database. It means that desired information from database is already indexed. In order to retrieve that information, just uses it's index when searching a requested query (fig.1, col.1, lines 40-41; col.2, lines 19-22).

As to claims 4 and 12, Bach teaches the claimed limitation "applying said extracted indices to said transformed database" as referring to Fig.1, and image (i) 102 is stored in the database, is fed into an analysis phase module 104 of a visual information retrieval (VIR) engine 100 for analysis. In the analysis phase 104, a feature vector (i) 106, which is used as an index for the image is extracted and stored into a database 108. In this comparison phase, a feature vector (target) 110 is fed into a comparison phase module 112 VIR engine and the VIR engine sequentially computes distances between the target feature vectors 110 and each feature vector (I) 106 stored in the database 108. The comparison is made between individual feature vectors using a distance metric associated with a primitive. This distance is then selectively weighted using user-defined weights 114 and weighted distances are combined to provide an output score 116 for each comparison. The above points shows that the system using extracted indexes to converted database (col.1, lines 45-53; col.2, lines 19-20).

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure

Aggarwal et al (USP 5781906)

Li et al (USP 5734893)

Contact Information

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cam-Y Truong whose telephone number is (703-605-1169). The examiner can normally be reached on Mon-Fri from 8:00AM to 4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim Vu, can be reached on (703-305-4393). The fax phone numbers for the organization where this application or proceeding is assigned is (703-308-9051).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703-305-3900).

CY

November 14, 2000

KIM VU
PATENT EXAMINER
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